

Fan ZJ, Silverstein BA et al. Quantitative Exposure-Response Relations Between Physical Workload and Prevalence of Lateral Epicondylitis [LE] in a Working Population. Am J Ind Med 2009;52:479-490.

Design: Cross-sectional workplace survey

Population/sample size/setting:

- 733 workers (52.3% male, mean age 39.5) in 12 different sites in Western Washington State from 2001 to 2004
- The 12 sites were either manufacturing (electronics, auto parts, etc) or health care (hospitals and health research areas not doing direct patient care)
- Workplaces were examined by study ergonomists who determined that at least 3 out of 6 combinations of hand force and repetition were present in the facility; these facilities were eligible for inclusion in the study
- All permanent full-time employees were eligible for inclusion in the survey; 64/5% completed consent forms and were entered into the study

Main outcome measures:

- Ergonomists categorized jobs into low and high levels of hand force and into three levels of repetitiveness (low, medium, high)
- Structured interviews collected data on age, gender, race, other medical conditions, leisure activity, and workers' compensation claims; height and weight were measured to calculate BMI
- All subjects were screened for symptoms of pain or discomfort in the past 12 months and the past 7 days
- All subjects had brief physical exam by MD, RN, or PT blinded to reported symptom status; LE in the dominant arm was diagnosed in 38 workers, and was the main outcome of interest
- Physical load factors were assessed on-site by ergonomists who directly observed the workers and also videotaped using 2 synchronized cameras from 2 different angles for at least 15 minutes during a work shift
- The videotaped data were used to measure awkward posture, frequency, percent of time in tasks, and power tool use
- Forceful exertions were defined as 2 lbs of pinch grip, or as pushing/pulling or lifting more than 10 lbs
- LE cases were exposed to higher frequencies and longer durations of forceful exertions than workers without LE
- In logistic regression models adjusted for age, gender, and BMI, frequency of forceful exertions, percent of duty cycle spent in forceful exertions, time-weighted average of forceful lifting, forearm supination past 45°, and the combination of forearm supination & forceful lifting, were all greater for the LE cases than for the non-cases
- LE cases also had less job satisfaction, lower social support, and were more likely to rotate work tasks than non-cases

Authors' conclusions:

- LE is related to the frequency of forceful exertions or a combination of forearm supination and forceful lifting
- Age, smoking, and being female increased the odds of LE, and high social support appears protective
- Physical load and psychological factors may be modifiable and would reduce the risk of LE in the workplace
- The cross-sectional nature of the study means that the identified factors may not be causal

Comments:

- The kappa for inter-examiner agreement for physical signs on the right and left elbows was 0.37 and 0.27; conventionally, kappa between 0.2 and 0.4 is considered only fair agreement
- The reliability of the diagnosis of LE may not have been great because of the limited inter-examiner reliability, but this might dilute the odds ratios for LE
- Physical examinations were done blinded to symptom status, and were thus protected from bias
- There is a strong theoretical advantage in videotaping the workers from 2 angles; classification of frequency and posture could be made more robust than is ever the case with self-report
- A comparison of the physical load estimated by videotape might have been profitably compared with that by self-report, but this comparison was not made
- The video taping was done during a 15 minute “typical” work period, but how the periods were identified as typical is not clear
- The logistic regression was well-planned, since the researchers noticed that age and BMI were not linearly related to the outcome, and treated them appropriately as categorical variables in the final model
- The planning and analysis were of good quality, and the exposure assessment might be a desirable model for other studies of this nature
- The study is done in an industrial setting, in which it is likely that the relevant exposures occur for most of the work day (6 hours or more)

Assessment: High quality (good classification of physical load, thoughtful analysis)